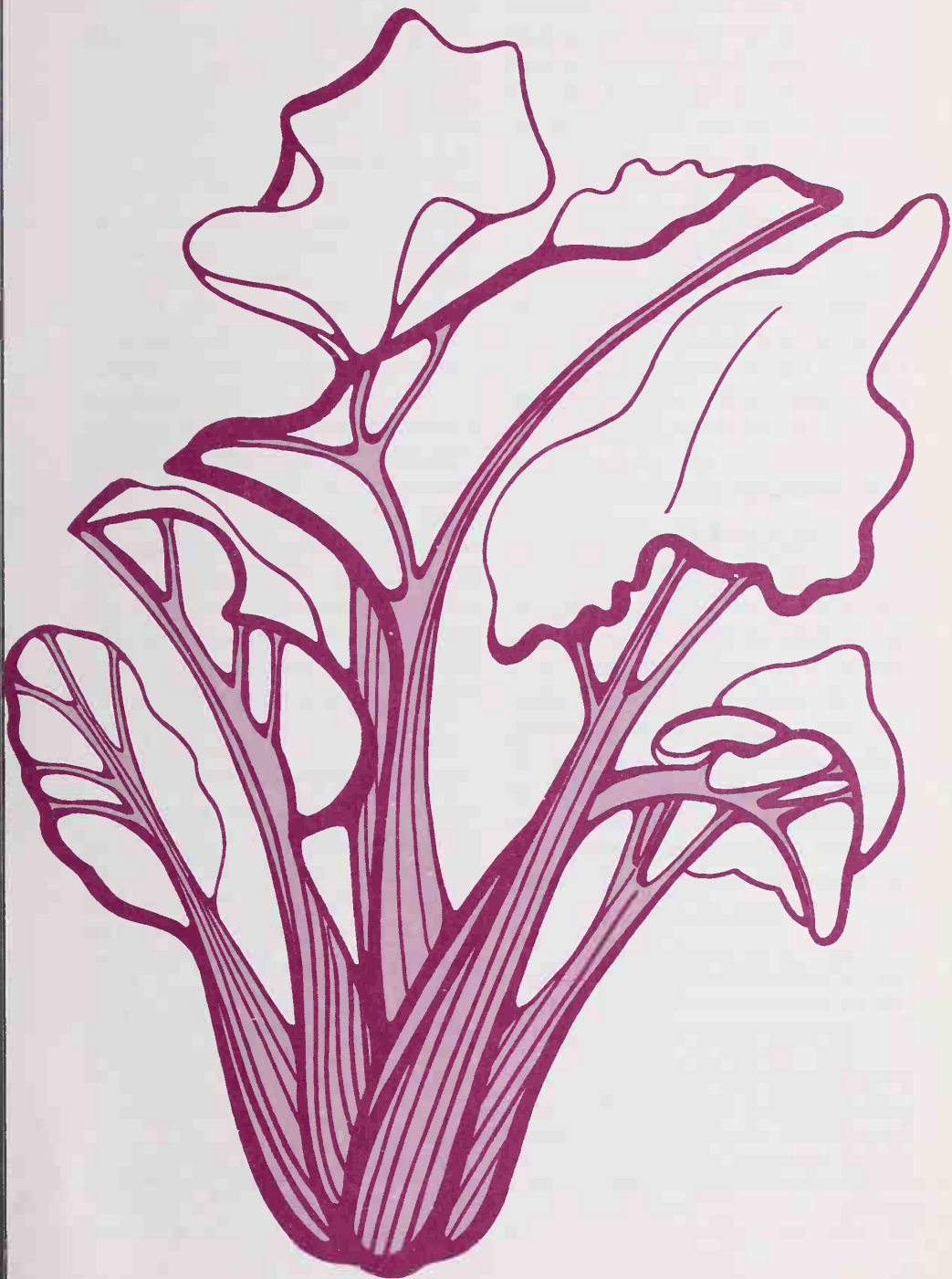


RHUBARB PRODUCTION



Agricultural Research Service

U.S. DEPARTMENT OF AGRICULTURE



LEAFLET No. 555

RHUBARB PRODUCTION

Rhubarb is a cool-weather perennial plant. It does not thrive, and is rarely grown, in places where the summer mean temperature is much above 75° F. or where the winter mean is much above 40°. It grows best in the northern tier of States from Maine south to Illinois and west to Washington. The rhubarb plant needs a temperature below 50° to break dormancy. It is poorly adapted to most of the southern half of the United States. Some plantings survive only a few months in the lower South.

OUTDOOR PRODUCTION

Soils and Fertility

Rhubarb will thrive in almost any type of soil—peat, sand, or clay—if it is well drained and fertile. Rhubarb grows best, however, in deep, fertile loams that are well supplied with organic matter. The plant is tolerant of soil acidity and does best in a slightly to moderately acid soil. If the crop is to be grown for the early market, select a site that

has a light sandy loam with a southern exposure.

Liberal quantities of fertilizer are needed to prepare land for planting. Broadcast 1,500 pounds of 10-10-10 fertilizer per acre before planting. The organic content of the soil may be increased by growing soil improvement crops and turning them under with 1,200 pounds per acre of 5-10-10 fertilizer.

Annual applications of fertilizers are usually needed. Before spring growth starts, broadcast about 400 pounds of ammonium nitrate and 200 pounds of muriate of potash and work into the soil.

An additional application of 60 pounds of nitrogen per acre may be applied in late June or early July. If followed by irrigation, the fertilizer will encourage growth for about another month.

Propagation and Planting

Rhubarb is propagated by planting pieces obtained by dividing the crowns. The pieces are taken from dormant 2- or 3-year-old crowns. After digging, split the dormant crowns between the large buds, or "eyes," to leave as large a piece of storage root as possible with each large bud. About four to eight pieces will be produced by each crown, depending on its size. Protect the pieces from excessive drying before they are planted.

In the northernmost regions, where severely cold weather strikes early after the growing

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CAUTION: Although the succulent leafstalks of rhubarb are excellent for sauces and pies, *the leaves of rhubarb must never be eaten.* The leaves contain amounts of oxalic acid and of oxalates sometimes great enough to cause fatal poisoning of those who eat them.

season, the division of crowns and planting is best done in early spring. In regions of less severe winters and longer autumn seasons, the work may be done in autumn after the tops have been killed by the first freezes.

Propagation by seed is not recommended because rhubarb seedlings do not retain the characteristics of the parent plants.

Transplant crown pieces or sets 2 to 3 feet apart in furrows that are 4 to 5 feet apart, depending on the machinery that will be used later in the crop. Cover with 2 to 3 inches of soil. Press the soil firmly around the entire piece.

Varieties

Varieties for outdoor use that have red stalks are Crimson Wine, Valentine, McDonald, and Ruby. Crimson Wine produces larger stalks than the other three red stalk varieties. It also yields larger stalks than the forcing varieties that usually produce green stalks when grown outdoors.

Cultivation

To control weeds, shallow cultivation is required. Cover the

rows with a mulch soon after the ground is frozen. You can also apply strawy manure in the spring; it should be raked off the rows and worked into the soil between the rows. Leaving a heavy mulch over the rows delays early growth because it prevents the sun's rays from warming the soil.

Diseases and Insects

Foot rot, also called phytophthora crown rot, is the most serious disease affecting rhubarb. Slightly sunken lesions develop at the base of the stalk and enlarge rapidly to cause collapse of the whole leafstalk. Stalks may continue to collapse in moist, warm weather until the plant is killed. There is no effective control for foot rot.

One insect—the rhubarb curculio—may cause serious damage to rhubarb plants. This is a rusty snout beetle about three-fourths of an inch long. It bores into the stalks, crowns, and roots. It also attacks wild dock (coarse weeds).

This insect may be controlled by burning all infested plants; and by destroying wild dock growing in the area of the rhubarb patch. This should be done in July, after the beetles have laid their eggs.

In commercial forcing of rhubarb, leaf rots are a serious problem and can be controlled by—

- Sanitation—remove all broken pieces of roots and crowns from the forcing house.
- Ventilation—keep enough air

circulating through the forcing house to keep the leaves dry.

- Chemical protection—spray captan at the rate of 2 pounds of 50-percent wettable powder in 100 gallons of water once a week during the forcing season.

Harvesting

The rhubarb harvest season is short, rarely extending more than 2 months. For field harvest, do not pull leafstalks from newly set plants during the first year, and pull only a few the second year.

Harvest only the largest and best stalks. The leafstalks separate readily from the crown and are easily harvested by grasping them near the base and pulling them slightly to one side in the direction in which the stalk grows.

Thin the smaller stalks to permit better development of those remaining. After harvesting, let the plants grow naturally, but remove the seedstalks. Cut off seedstalks as soon as they arise to conserve the energy of the plant for production of foliage and roots.

A heavy crop of rhubarb in any year depends on strong leaf growth the year before. Yields of 10 to 12 tons per acre per year are common. In the State of Washington, Crimson Wine yields up to 20 tons per acre per year.

INDOOR PRODUCTION

The term "forcing" of rhubarb means the winter growing of rhubarb stalks from large crowns that have been taken from the field into a house or other shelter

that can be suitably heated. This method of production is referred to as hothouse production.

Varieties for indoor production or forcing are Victoria, German Wine, Sutton's Seedless, and Strawberry.

Field Production for Forcing

Crowns grown two full summers in the field under favorable conditions are large enough for forcing. Three-year-old crowns are not superior to 2-year-old crowns for this purpose if the cost of producing the crowns is considered.

Growth of crowns in the field largely indicates their potential value for forcing. Large crowns with a few large, strong buds are preferred to those with small or weak buds. Large fancy stalks cannot be developed from small, weak buds.

Those who force rhubarb year after year divide the crowns from part of their plantings to establish one new planting every year. This makes 2-year-old crowns each autumn. Crowns from fields that have been harvested for outdoor rhubarb are not recommended for forcing. They produce poor yields.

Structures for Forcing

Houses about 30 feet wide and 100 to 120 feet long are commonly used for forcing, but other sizes will also serve. These houses are usually of wood, with side walls about 4 to 6 feet high. A ridge 3 to 4 feet higher than the side walls is built through the middle. A

row of purlin posts is placed on either side of the ridge, about halfway between the ridge and the side walls.

The end walls are removable, so that a vehicle can be driven through the house between the lines of posts when bringing in or taking out the roots. In some cases, however, the houses are not of sufficient height to permit driving through without removing the roof boards.

These roof boards rest on the side walls and ridgepole, they are covered with straw, manure, corn fodder, sod, or other material for the purpose of excluding light and conserving heat. Ordinarily, these boards are not placed in position until shortly before heat is to be applied. The floor is of soil.

Forcing structures may be heated by any convenient means. Small coal stoves were formerly in common use (1 stove for about 1,000 square feet of floor space), with long runs of stovepipe inside the house to help distribute the heat. Such installations, however, waste fuel and manpower. Hot-water furnaces with long runs of heat-radiating pipe are much more efficient and have displaced stoves to a considerable extent. Many growers also use forced-air gas heaters in the forcing house.

Crowns for the Forcing House

When top growth of rhubarb in the field stops in autumn, the buds on the crowns go into a rest period of many weeks. No satisfactory stalk production can be

expected until the rest period is over.

Exposure of crowns in the field to temperatures below 50° F. for 7 to 9 weeks will bring them out of the rest period. They will grow when given the proper temperature in the forcing house.

Hard freezing in the field for a few days is not sufficient to bring crowns out of the rest. A field treatment of 28° F. for 6 weeks gave highest yields in experiments in Canada. Temperatures below 28° will reduce yields.

Crowns for forcing may be plowed out at any time that the soil can be worked after the tops

Cold Units

Soil temperature is measured in "cold units." A drop of one degree below 49° F. and above 28° is considered one cold unit.

A certain amount of chilling is required to bring the plants out of their rest period and to start growth in the forcing house. To do this, take soil temperature at a 4-inch depth between 8:30 and 9:30 a.m. in the fall. Any reading above 50° F. should be discounted; the soil temperature must be below the base line of 49° before a reading is made.

Cold units should be recorded between early October and early December. If the temperature drops to 28° F. or below, do not count as cold units. Discard all cold units and start counting again, if the temperature drops below 24°. See guide on page 6.

have died in autumn. Run a large plow deeply under the rows so the crowns will be turned out with a large mass of storage roots and with a minimum of injury.

The most common practice is to plow out the crowns soon after the tops are dead. The crowns are then left lying in the rough soil until it is convenient or necessary to put them into the forcing structure. They must, of course, be moved before extreme winter weather stops all field work.

Where weather permits, the plowed-out crowns are left exposed to low temperatures in the field for about 4 to 6 weeks. In western Washington where the winters are mild, however, the crowns are plowed-out just prior to forcing from mid-December through March. In some localities, the crowns are promptly placed in the cold-forcing structure, exactly as they are to stand during forcing.

The crowns are then kept cold, even frozen, until their rest period is over and it is time to start the heat. The "knock-down" type of structure (described in the section, Structures for Forcing), was developed to expose the bedded crowns to low temperature as well as to give protection and heat at the proper time.

Crowns bedded before chilling is completed and those bedded afterward are handled the same way. They are set on the earth floor of the house as close together as practicable. The spaces about them are filled with soil, and the soil is watered. Each crown re-

Guide for recording cold units

Date	Soil temperature between 8:30 and 9:30 a.m. and (Degrees)	Cold Units (Degrees below 49° F.)	Accumulated Cold Units
1.	42°	7	7
2.	40°	9	16
3.	49°	0	16
4.	30°	19	35
5.	28°	20 (Maximum for one day)	55
6.	20°	0 (Discount below 24° F.)	55
7.	30°	19	74
8.	37°	12	86

Victoria and German Wine will require about 470 to 500 cold units to force successfully.

quires 1 to 2 square feet of bed space; the spacing depends on the geographical area in which they are grown.

Forcing Temperatures

When the bedded crowns have been chilled for a period of 6 to 8 weeks, the house may be closed and mild heat applied. If, however, it is planned to start forcing relatively late, then the crowns should be left unheated until forcing starts.

The best yields are obtained at a forcing temperature close to 56° F. Lower temperatures give more intense pink color in the stalks, which increases their attractiveness, but causes slower growth. At temperatures below 50°, stalk growth is very slow, which may result in lower yields.

Above 60° F., the stalk color becomes paler than at lower temperatures, the growth rate is faster, and yields begin to decline.

Above 65°, the growth rate is quite fast, the color is poor, and the total yields are much lower than at 55°.

Considering yield, color, and growth rate, a temperature of 56° F. is best. Regardless of temperature, the stalk color gradually becomes less intense toward the end of the forcing season as the crowns become exhausted.

Good results have been obtained experimentally with bottom heat supplied by electric hot-bed heating cable at a house temperature of 50° F. and a bed temperature of 55°. Bed temperatures of 65° or more will decrease yields and greatly increase power consumption. Humidity should be kept very high in the house.

Commercial growers in Washington and Michigan are now using gibberellic acid, a growth-regulating chemical, to increase production of forced rhubarb. Since gibberellic acid can replace all or part of the cold weather needed to break the rest period—rhubarb crowns can be forced earlier. Also, gibberellic acid increases the production and shortens the forcing season of crowns that have received sufficient chilling to break their rest period. (See the manufacturer's instructions for application rates and other details.)

Watering the Beds

Watering to keep the soil moderately moist (as in a good workable condition) helps to maintain good growth without impairing color or other quality of the

stalks. Production falls off sharply in beds that become dry.

Harvesting and Preparing for Market

Harvesting normally is begun about a month to 6 weeks after the heat is applied. Duration of harvesting depends on such factors as variety, crown, vigor, and forcing temperature. The stalks are usually picked twice a week for a 2-to-3 month period. Many Washington growers double-crop their houses. Victoria is forced from about December 15 to March 1, followed by German Wine. After the roots are forced they should be discarded.

Stalks are picked when they are 12 to 20 inches long; the length depends on the variety and market requirements. Washington grown rhubarb is graded into two classes, fancy and extra fancy. Leaves are removed to within 1 inch of the top of the stalk. Boxes holding 15 pounds each are used for shipping.

Michigan rhubarb is sold in three grades: choice; small fancy; and fancy. Leaves are not removed from the stalks. The rhubarb is packed in cardboard cartons, each holding 5 pounds, and are sent to market in "master" corrugated cardboard boxes containing 50 pounds net. A small amount, however, is packed in 15-pound boxes.

Home Forcing

The principles and methods described above can be adapted to the forcing of a few plants in a

suitable home basement or cellar. A half dozen or so of good crowns produce enough rhubarb for the average family. Proper temperature will not be too difficult to provide, but the humidity of heated modern basements is likely to be too low.

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U.S. DEPARTMENT OF AGRICULTURE

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